
1. PRODUCT AND MANUFACTURER IDENTIFICATION

Product names:

NanoZorb™

Manufacturer:

NanoScale Corporation
1310 Research Park Drive
Manhattan, KS 66502
(785) 537-0179

Product Information:

(785) 537-0179
24-Hour Chemtrec Emergency Number:
U.S. (800) 424-9300
International (703) 527-3887

2. CHEMICAL COMPOSITION AND EXPOSURE LIMITS

| <u>Component</u> | <u>CAS Number</u> | <u>OSHA PEL</u> | <u>ACGIH TLV</u> |
|-----------------------|-------------------|----------------------|----------------------|
| Magnesium Oxide | 1309-48-4 | 15 mg/m ³ | 10 mg/m ³ |
| Titanium (IV) Dioxide | 13463-67-7 | 15 mg/m ³ | 10 mg/m ³ |
| Zinc Oxide | 1314-13-2 | 15 mg/m ³ | 10 mg/m ³ |

3. HAZARD IDENTIFICATION AND EMERGENCY OVERVIEW

Appearance and Odor: White odorless powder

Routes of Exposure: Eye and skin contact, inhalation, ingestion.

Eye Contact: Slight to moderate eye irritation

Skin Contact: May cause irritation

Inhalation: May cause respiratory tract irritation

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea

Acute Health Effects: May cause irritation of the skin and eyes. Inhalation of dust may cause irritation of mucus membranes and the upper respiratory tract causing coughing and sneezing.

Chronic Health Effects: Prolonged and repeated exposure to skin may cause irritation or dermatitis.

4. FIRST AID MEASURES

Skin: In case of skin contact flush with copious amounts of water for at least 15 minutes, remove contaminated clothing and shoes. If irritation continues after flushing, seek medical attention.

Inhalation: If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. DO NOT use mouth-to-mouth respiration.

Eyes: In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating eyelids with fingers. Seek medical attention.

Ingestion: If conscious and alert, rinse mouth and drink 2-4 cupfuls of water or milk. Seek medical attention. Do NOT induce vomiting.

5. FIRE-FIGHTING MEASURES

This product is not flammable, combustible, or explosive. May emit toxic fumes at temperatures greater than 2800°C. The formulation may be exposed to water, carbon dioxide, dry chemical and foam-extinguishing agents as necessary during fire-fighting operations. Full protective gear and a NIOSH approved self-contained breathing apparatus (SCBA) should be used to protect eyes, skin, and lungs from exposure during firefighting operations around zinc oxide. During a fire, irritating and highly toxic gases, such as zinc oxide fume, may be generated by thermal decomposition or combustion.

6. ACCIDENTAL RELEASE MEASURES

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, using the appropriate protective equipment. Avoid generating dusty conditions and provide adequate ventilation.

7. HANDLING AND STORAGE

Store in a closed container in a cool, dry location to avoid slow reactions with carbon dioxide and moisture in air. Use dust control and protection in handling and storage. Avoid storage near magnesium, rubber, and strong oxidizers.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Respiratory Protection: Use NIOSH approved respirator when use is necessary.

Skin Protection: Wear appropriate protective gloves to minimize skin exposure.

Eye Protection: Wear appropriate protective glasses or chemical safety goggles.

Titanium dioxide can adsorb moisture and natural oils from the surface of the skin during prolonged exposure. Prolonged exposure should be avoided by wearing suitable protective gloves and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White Powder

Odor: Odorless

10. STABILITY AND REACTIVITY

Stability: Stable under normal temperatures and pressures.

Hazardous Polymerization: None reported.

Incompatibility: Lithium at 200° C, chlorinated rubber, linseed oil, magnesium, aluminum + hexachloroethane, zinc chloride or strong oxidizing agents; reacts violently with phosphorus pentachloride, chlorine trichloride, or bromine pentafluoride.

Decomposition Products: Toxic gases such as metal fumes may be released in a fire.

11. TOXICOLOGICAL INFORMATION

TiO₂

Acute Oral Toxicity: LD₅₀ > 2 g/kg

Acute Dermal Toxicity: LD₅₀ > 5 g/kg

Acute Dermal Irritation: PII = 0, non-irritating

Skin Sensitization: Non-sensitizer

Acute Eye Irritation: Practically non-irritating

Acute Inhalation: EPA Toxicity Category IV, non-toxic.

Chronic *dust* inhalation exposure (250 mg/m³ for 6hrs/day, 5day/week for 2 years) can be a potential carcinogen to rats. The authors of this study concluded that based on the excessive dust loading and overwhelmed clearance mechanism in the lungs of rats exposed chronically at 250 mg/m³, the biological relevance of lung tumors to man appears to be negligible.

A number of epidemiology studies evaluating > 20,000 TiO₂ industry workers in Europe and the United States have been reported. Workers employed for at least six months in TiO₂ production were assessed using company records and quality controls, taking into account the different manufacturing procedures used at the sites as well as the actual relative levels of exposure to respirable TiO₂. Exposure categories such as job site, title, and calendar years on the job were examined. Findings from each of the studies were similar, in that the authors concluded that the results did not suggest a carcinogenic effect of TiO₂ dust on the human lung, and mortality from other chronic diseases, including other respiratory diseases, was not associated with exposure to TiO₂ dust. Based upon the results of these studies, NanoScale Corporation concludes that titanium dioxide will not cause lung cancer or chronic respiratory disease in humans at concentrations experienced in the workplace.

ZnO

Acute Oral Toxicity: LD₅₀ > 2 g/kg

Acute Dermal Toxicity: LD₅₀ > 5 g/kg

Acute Dermal Irritation: PII = 0, non-irritating

Skin Sensitization: Non-sensitizer

Acute Eye Irritation: Moderately irritating

MgO

Acute Oral Toxicity: LD₅₀ > 5 g/kg

Acute Dermal Irritation: EPA Category IV, non-irritating

Skin Sensitization: Non-sensitizer

Acute Eye Irritation: EPA Category III, slightly irritating.

Acute Inhalation: EPA Toxicity Category IV, non-toxic.

Carcinogen status: OSHA – No, NTP – No, ACGIH (TiO₂) – Group 3; Not classifiable as a human carcinogen. IARC (TiO₂) – 2B; possibly carcinogenic to humans

Although the three animal studies reviewed by IARC showed evidence of tumors it is important to note that these studies tested pigmentary and ultrafine titanium dioxide. As stated in the IARC *draft* monograph, volume 93, primary particle sizes for pigmentary titanium dioxide are typically between 0.2 and 0.3 μm. Ultrafine grades range from 10-50 nm. NanoScale's NanoActive® Titanium Dioxide particles are larger and do not fall into the pigmentary or ultrafine classifications. Also, as realized in studies reviewed by NIOSH, the toxicity seems to be more related to the particle size rather than the chemical itself.

12. ECOLOGICAL INFORMATION

None available.

13. DISPOSAL CONSIDERATIONS

Disposal should be in accordance with applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

(49 CFR 172.101-2): Not listed.

15. REGULATORY INFORMATION

TSCA: All components are listed in the TSCA inventory.

SARA (Title 313): Components are not subject reporting requirements.

CERCLA RQ: None

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

16. OTHER INFORMATION

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. NanoScale Corporation makes no warranty with respect hereto and disclaims all liability from reliance thereon. The information is intended for use by persons with professional knowledge of the subject matter or with access to such persons. Persons receiving this information are urged to conduct their own assessment of the suitability and completeness of the information for their particular application.